ARM Cortex™-M0
32-bit Microcontroller

NuTiny-SDK-Nano130 User Manual
for NuMicro™ Nano130 Series

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For additional information or questions, please contact: Nuvoton Technology Corporation.

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1 Overview

The NuTiny-SDK-Nano130 is a specific development tool for the NuMicro Nano130 series users to develop and verify the application program easily. The NuTiny-SDK-Nano130 includes two portions: NuTiny-EVB-Nano130 (an evaluation board) and Nu-Link-Me (its Debug Adaptor), such that users do not need additional ICE or debug equipment.

2 Introduction to NuTiny-SDK-Nano130

The NuTiny-SDK-Nano130 uses the NANO130KE3BN as the target microcontroller. *Figure 2-1* shows the NuTiny-SDK-Nano130 for Nano130 series, in which the left portion is called NuTiny-EVB-Nano130 and the right portion is called Nu-Link-Me.

The NuTiny-EVB-Nano130 is similar to other development boards, by which users can develop and verify applications to emulate the real behavior. The on board chip covers Nano130 series features. The NuTiny-EVB-Nano130 can be a real system controller to design the users' target systems.

The Nu-Link-Me is a Debug Adaptor, which connects your PC's USB port to a target system (via Serial Wired Debug Port) and allows you to program and debug embedded programs on the target hardware. To use the Nu-Link-Me Debug adaptor with IAR or Keil, please refer to "*Nuvoton NuMicro™ IAR ICE Driver User Manual*" or "*Nuvoton NuMicro™ Keil ICE Driver User Manual*" for details. The two documents will be stored in the local hard disk when each is installed.

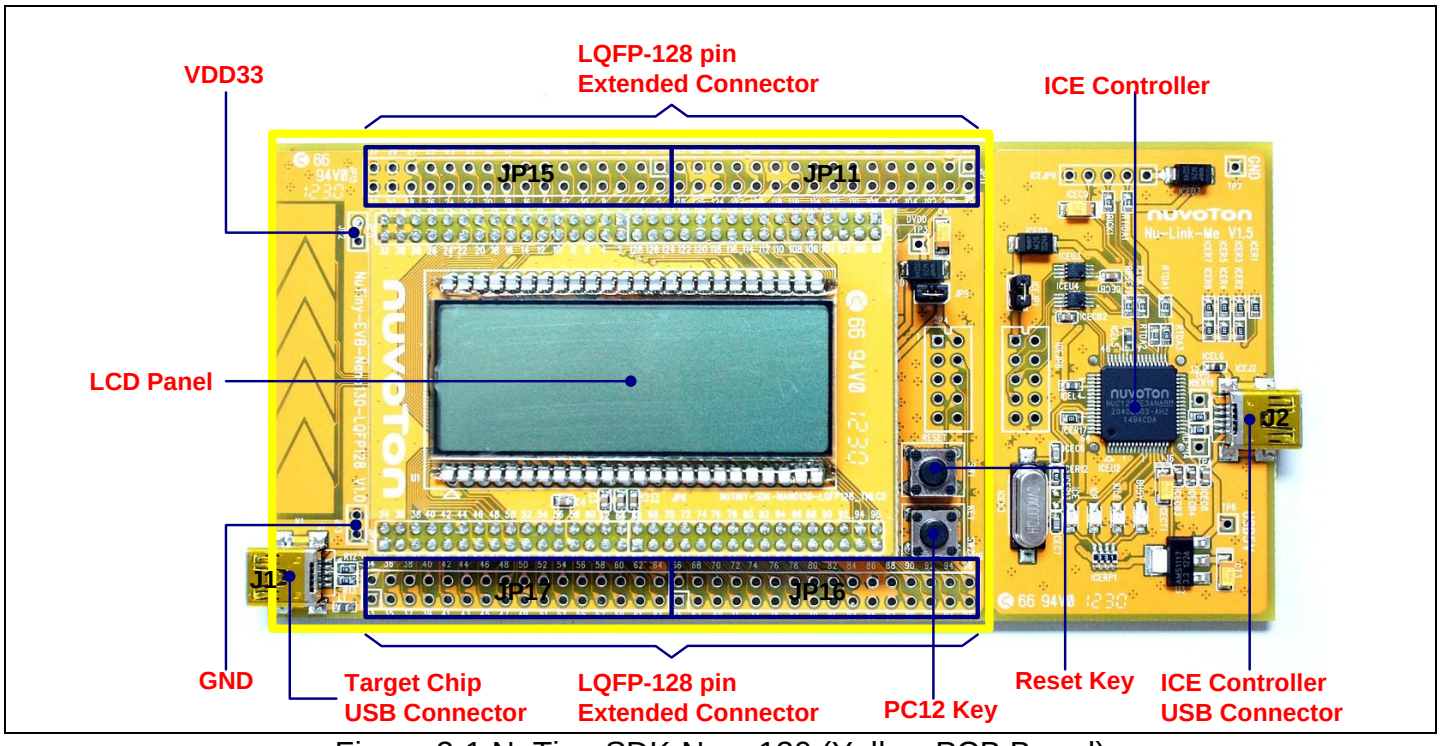


Figure 2-1 NuTiny-SDK-Nano130 (Yellow PCB Board)

2.1 NuTiny-SDK-Nano130 Jumper Description

2.1.1 Power Settings

- **J1**: USB port in NuTiny-EVB-Nano130
- **JP2**: VDD33 Voltage connector in NuTiny-EVB-Nano130
- **J2**: USB port in Nu-Link-Me

Power Model	J2 USB Port	J1 USB Port	JP2 VDD33	MCU Voltage
Model 1	Connect to PC	X	DC 3.3V output	DC 3.3V
Model 2	X	Connect to PC	DC3.3V output	DC 3.3V
Model 3	X	X	DC 1.8 V ~ 3.6 V Input	DC 1.8 V ~ 3.6 V Decided by **JP2** VDD33 Input

X: Unused.

2.1.2 Debug Connectors

- **JP4**: Connector in target board (NuTiny-EVB-Nano130) for connecting with Nuvoton ICE adaptor (Nu-Link-Me)
- **JP8**: Connector in ICE adaptor (Nu-Link-Me) for connecting with a target board (e.g. NuTiny-EVB-Nano130)

2.1.3 USB Connectors

- **J1**: Mini USB Connector in NuTiny-EVB-Nano130 for application use
- **J2**: Mini USB Connector in Nu-Link-Me connected to a PC USB port

2.1.4 Extended Connectors

- **JP11**, **JP15**, **JP16** and **JP17**: Show all chip pins in NuTiny-EVB-Nano130

2.1.5 Buttons

- **SW1**: Reset button in NuTiny-EVB-Nano130
- **SW2**: PC12 button in NuTiny-EVB-Nano130

2.1.6 Power Connectors

- **JP2**: VDD33 connector in NuTiny-EVB-Nano130
- **JP3**: GND connector in NuTiny-EVB-Nano130

2.1.7 Power Jumpers

- **JP1**: Jumper in ICE adaptor (Nu-Link-Me) for power source selection of **JP8**.
- **JP9**: Jumper in NuTiny-EVB-Nano130 to set power source from **JP4** and **J1**

2.2 Pin Assignment for Extended Connectors

The NuTiny-EVB-Nano130 provides the NANO130KE3BN target chip on board and the extended connectors (**JP11**, **JP15**, **JP16** and **JP17**) for LQFP128-pin.

No	Pin Name	No	Pin Name	No	Pin Name	No	Pin Name
01	PE13/ LCD_SEG27	33	PE12/UART1_CTSn	65	PE4/SPI0_MOSI0	97	VREF
02	PB14/INT0/SC2_CD/ SPI2_SS1/LCD_SEG12/ LCD_SEG26	34	PE11/UART1_RTSn	66	PE3/SPI0_MISO0	98	NC
03	PB13/EBI_AD1/ LCD_SEG11/LCD_SEG25	35	PE10/UART1_TXD	67	PE2/SPI0_CLK	99	AVDD
04	PB12/EBI_AD0/ CLKO/LCD_SEG10/ LCD_SEG24	36	PE9/UART1_RXD	68	PE1/PWM1_CH3/SPI0_SS0	100	PD0/UART1_RXD/ SPI2_SS0/SC1_CLK/ CTK0/AD8
05	NC	37	PE8/LCD_SEG9	69	PE0/PWM1_CH2/ I2S_MCLK	101	PD1/UART1_TXD/ SPI2_CLK/SC1_DAT/ AD9/CTK1
06	X320	38	PE7/LCD_SEG8	70	PC13/SPI_MOSI1/ PWM1_CH1/SNOOPER/ INT0/I2C0_SCL	102	PD2/UART1_RTSn/ I2S_LRCLK/SPI2_MISO0/ SC1_PWR/AD10/CTK2
07	X32I	39	NC	71	PC12/SPI1_MISO1/ PWM1_CH0/ INT0/I2C0_SDA	103	PD3/UART1_CTSn/ I2S_BCLK/SPI2_MOSI0/ SC1_RST/AD11/CTK3
08	NC	40	NC	72	PC11/SPI1_MOSI0/ UART1_TXD/ CTK15/LCD_SEG31	104	NC
09	PA11/I2C1_SCL/EBI_nRD/ SC0_RST/SPI2_MOSI0/ LCD_SEG9/LCD_SEG23	41	NC	73	PC10/SPI1_MISO0/ UART1_RXD/ CTK14/LCD_SEG30	105	PD4/I2S_DI/ SPI2_MISO1/SC1_CD/ CTK4/LCD_SEG35
10	PA10/I2C1_SDA/EBI_nWR/ SC0_PWR/SPI2_MISO0/ LCD_SEG8/LCD_SEG22	42	NC	74	PC9/SPI1_CLK/I2C1_SCL/ CTK13/LCD_SEG29	106	PD5/I2S_DO/ SPI2_MOSI1/CTK5/ LCD_SEG34
11	PA9/I2C0_SCL/ SC0_DAT/SPI2_CLK/ LCD_SEG7/LCD_SEG21	43	NC	75	PC8/SPI1_SS0/ EBI_MCLK/I2C1_SDA/ CTK12/LCD_SEG28	107	PC7/DA1_OUT/ EBI_AD5/TC1/ PWM0_CH1/LCD_SEG17
12	PA8/I2C0_SDA/ SC0_CLK/SPI2_SS0/ LCD_SEG6/LCD_SEG20	44	PB0/UART0_RXD/ SPI1_MOSI0/ LCD_SEG1/LCD_SEG7	76	PA15/PWM0_CH3/ I2S_MCLK/TC3/SC0_PWR/ UART0_TXD/LCD_SEG27	108	PC6/DA0_OUT/ EBI_AD4/TC0/ SC1_CD/PWM0_CH0
13	PD8/LCD_SEG19	45	PB1/UART0_TXD/ SPI1_MISO0/ LCD_SEG0/LCD_SEG6	77	PA14/PWM0_CH2/ EBI_AD15/TC2/ UART0_RXD/LCD_SEG26	109	PC15/EBI_AD3/ TC0/PWM1_CH2/ LCD_SEG16/LCD_SEG33
14	PD9/LCD_SEG18	46	PB2/UART0_RTSn/ EBI_nWRL/SPI1_CLK/ LCD_COM3/LCD_SEG 5	78	PA13/PWM0_CH1/ EBI_AD14/TC1/I2C0_SCL/ CTK11/LCD_SEG25	110	PC14/EBI_AD2/ PWM1_CH3/ LCD_SEG15/LCD_SEG32
15	PD10/LCD_SEG17	47	PB3/UART0_CTSn/ EBI_nWRH/SPI1_SS0/ LCD_COM2/LCD_SEG 4	79	PA12/PWM0_CH0/ EBI_AD13/TC0/I2C0_SDA/ CTK10/LCD_SEG24	111	PB15/INT1/ SNOOPER/ LCD_SEG14/LCD_SEG31
16	PD11/LCD_SEG16	48	PD6/LCD_SEG3	80	PF0/ICE_DAT/INT0	112	NC
17	PD12/LCD_SEG15	49	PD7/LCD_SEG2	81	PF1/ICE_CLK/ CLKO/INT1	113	XT1_IN
18	PD13/LCD_SEG14	50	PD14/LCD_SEG1	82	NC	114	XT1_OUT
19	PB4/UART1_RXD/ SC0_CD/SPI2_SS0/ LCD_SEG5/LCD_SEG13	51	PD15/LCD_SEG0	83	VDD	115	NC
20	PB5/UART1_TXD/	52	PC5/SPI0_MOSI1/	84	NC	116	nRESET

	SC0_RST/SPI2_CLK/ LCD_SEG4/LCD_SEG12		LCD_COM3				
21	PB6/UART1_RTSn/ EBI_ALE/SPI2_MISO0/ LCD_SEG3/LCD_SEG11	53	PC4/SPI0_MISO1/ LCD_COM2	85	VSS	117	VSS
22	PB7/UART1_CTSn/ EBI_nCS/SPI2_MOSI0/ LCD_SEG2/LCD_SEG10	54	PC3/SPI0_MOSI0/ I2S_DO/SC1_RST/ LCD_COM1	86	VSS	118	VSS
23	NC	55	PC2/SPI0_MISO0/ I2S_DI/SC1_PWR/ LCD_COM0	87	AVSS	119	NC
24	LDO_CAP	56	PC1/SPI0_CLK/ I2S_BCLK_SC1_DAT/ LCD_DH2	88	AVSS	120	VDD
25	NC	57	PC0/SPI0_SS0/ I2S_LRCLK/ SC1_CLK/LCD_DH1	89	PA0/AD0/ SC2_CD/CTK8	121	NC
26	NC	58	PE6	90	PA1/AD1/EBI_AD12/CTK9	122	PF4/I2C0_SDA/CTK6
27	VDD	59	LCD_VLCD	91	PA2/AD2/EBI_AD11/ UART1_RXD/LCD_SEG23	123	PF5/I2C0_SCL/CTK7
28	NC	60	LCD_VLCD	92	PA3/AD3/EBI_AD10/ UART1_TXD/LCD_SEG22	124	VSS
29	VSS	61	PE5	93	PA4/AD4/EBI_AD9/ SC2_PWR/I2C0_SDA/ LCD_SEG21/LCD_SEG39	125	PVSS
30	VSS	62	PB11/PWM1_CH0/ TM3/SC2_DAT/ SPI0_MISO0/LCD_V1	94	PA5/AD5/EBI_AD8/ SC2_RST_I2C0_SCL/ LCD_SEG20/LCD_SEG38	126	PB8/STADC/TM0/ INT0/SC2_PWR/ LCD_SEG13/LCD_SEG30
31	VSS	63	PB10/SPI0_SS1/ TM2/SC2_CLK/ SPI0_MOSI0/LCD_V2	95	PA6/AD6/EBI_AD7/ TC3/SC2_CLK/PWM0_CH3/ LCD_SEG19/LCD_SEG37	127	PE15/LCD_SEG29
32	VSS	64	PB9/SPI1_SS1/ TM1/SC2_RST/ INT0/LCD_V3	96	PA7/AD7/EBI_AD6/ TC2/SC2_DAT/ PWM0_CH2/CTK_CAP/ LCD_SEG18/LCD_SEG36	128	PE14/LCD_SEG28

Table 2-1 NANO130KE3BN LQFP 128-pin Assignment for Extended Connectors

2.3 NuTiny-SDK-Nano130 PCB Placement

The following figure shows the NuTiny-SDK-Nano130 PCB placement.

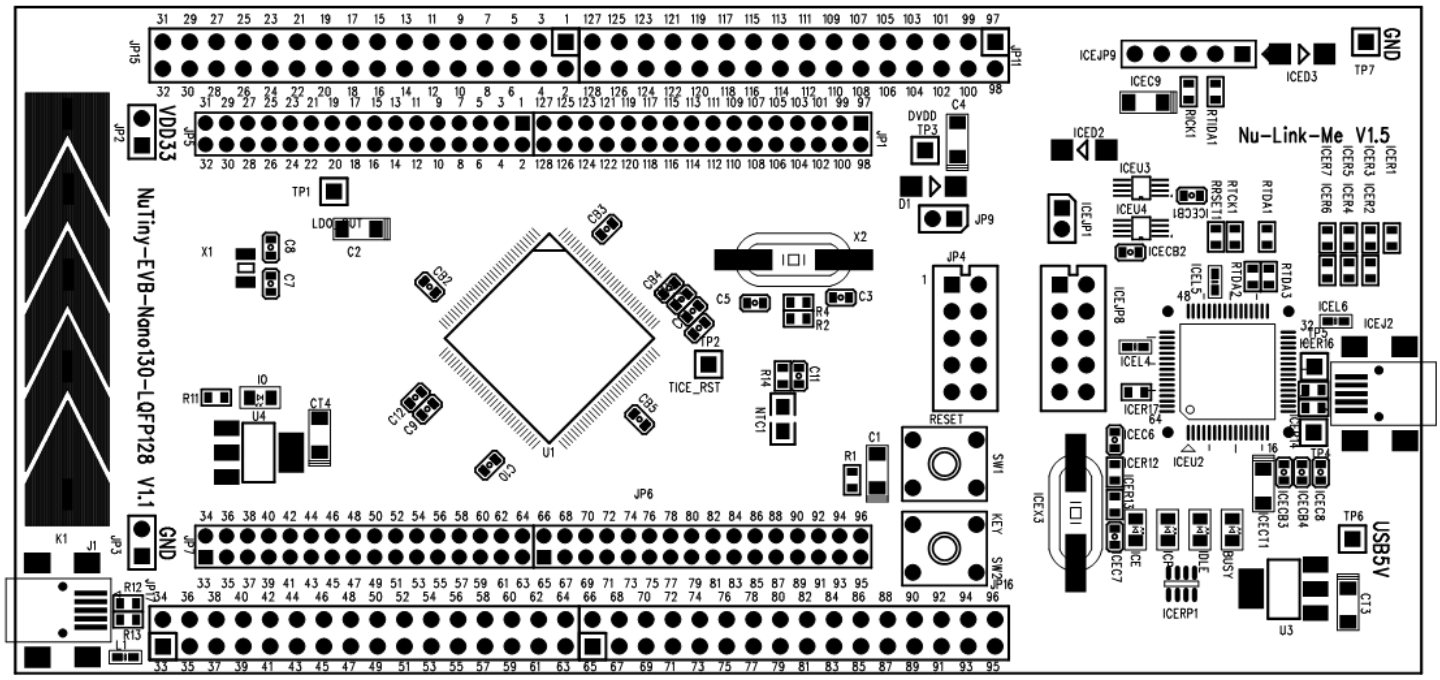


Figure 2-2 NuTiny-SDK-Nano130 PCB Placement

3 Starting to Use NuTiny -SDK-Nano130 on the Keil µVision® IDE

3.1 Downloading and Installing Keil µVision® IDE Software

Please connect to the Keil company website (http://www.keil.com) to download the Keil µVision® IDE and install the RVMDK.

3.2 Downloading and Installing Nuvoton Nu-Link Driver

Please connect to Nuvoton NuMicro™ website (http://www.nuvoton.com/NuMicro) to download the "*NuMicro™ Keil µVision® IDE driver*" file. Please refer to *section 6.1* for the detailed download flow. After the Nu-Link driver is downloaded, please unzip the file and execute the "*Nu-Link_Keil_Driver.exe*" to install the driver.

3.3 Hardware Setup

The hardware setup is shown in the following figure.

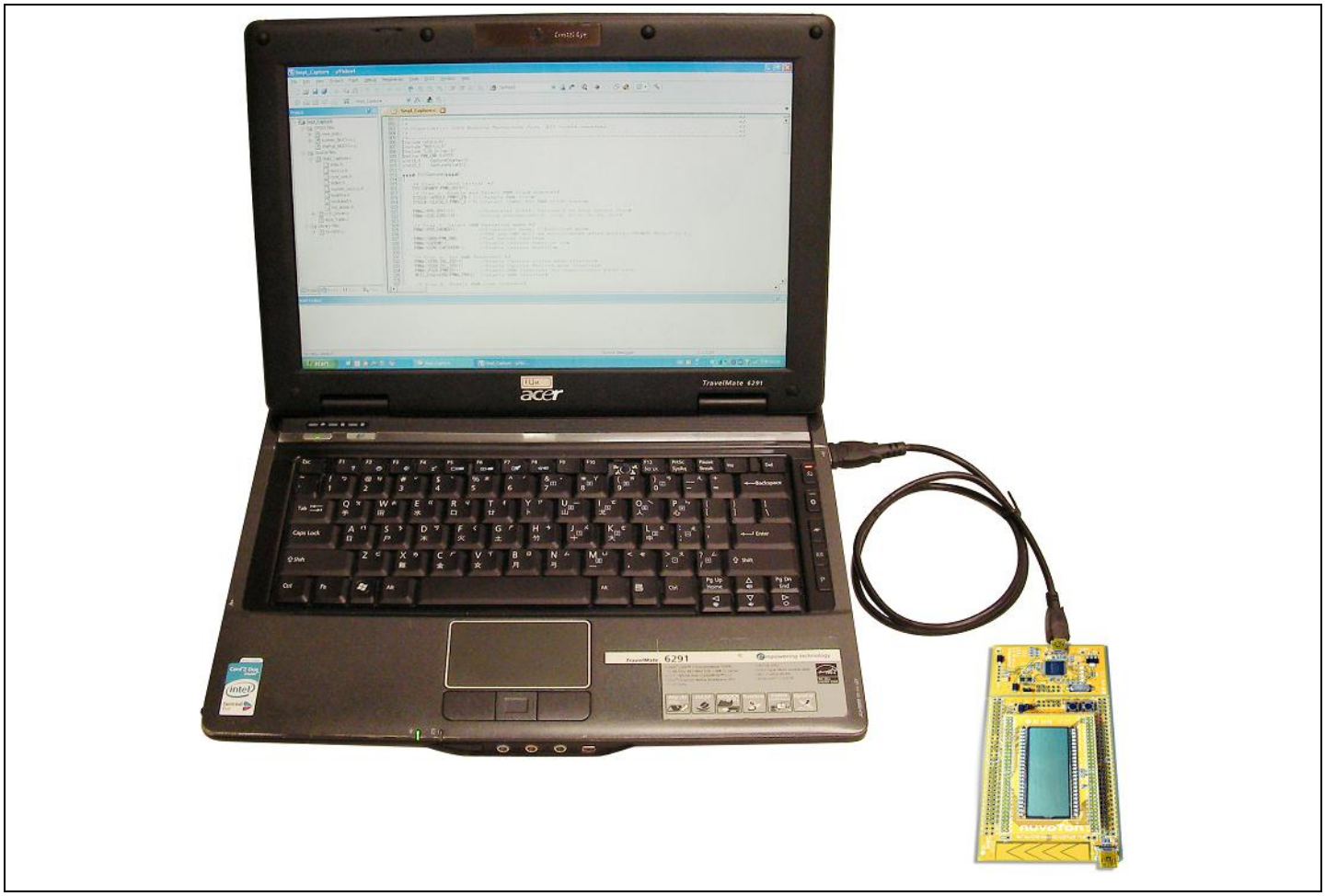


Figure 3-1 NuTiny-SDK-Nano130 Hardware Setup

3.4 LCD_DEMO Example Program

This example, as shown in the directory of *Figure 3-2*, demonstrates the download and debugging of an application on a NuTiny-SDK-Nano130 board. The example file can be downloaded from Nuvoton NuMicro™ website as described in *6.3 Downloading NuMicro™ Nano100 series BSP Software Library*.

Directory	Project File

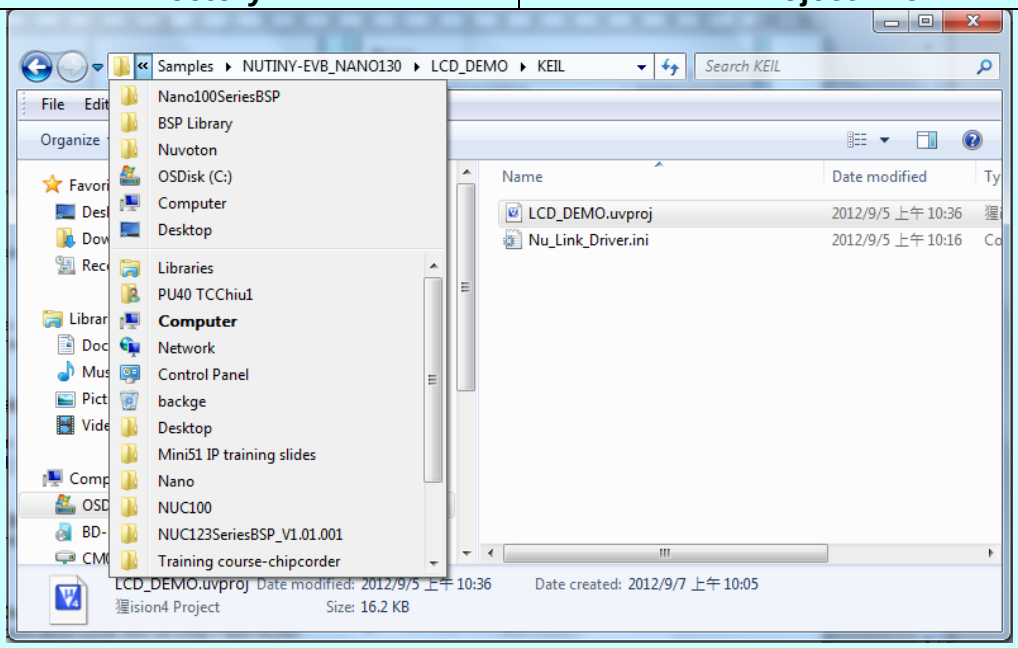


Figure 3-2 LCD_DEMO Example Directory

To use this example:
The LCD panel on the NuTiny-EVB-Nano130 board will display a NUVOTON logo.

- **Start µVision®**
- **Project-Open**
  Open the LCD_DEMO.uvproj project file
- **Project - Build**
  Compile and link the LCD_DEMO application
- **Flash – Download**
  Program the application code into on-chip Flash ROM
- **Start Debug mode**
  When using the debugger commands, you may:
  - Review variables in the watch window
  - Single step through code
  - Reset the device
  - Run the application

4 Starting to Use NuTiny-SDK-Nano130 on the IAR Embedded Workbench

4.1 Downloading and Installing IAR Embedded Workbench Software

Please connect to IAR company website (http://www.iar.com) to download the IAR Embedded Workbench and install the EWARM.

4.2 Downloading and Installing Nuvoton Nu-Link Driver

Please connect to Nuvoton Company NuMicro™ website (http://www.nuvoton.com/NuMicro) to download the "*NuMicro™ IAR ICE Driver User Manual*" file. Please refer to *section 6.2* for the detailed download flow. When the Nu-Link driver has been well downloaded, please unzip the file and execute the "*Nu-Link_IAR_Driver.exe*" to install the driver.

4.3 Hardware Setup

The hardware setup is shown in the following figure.

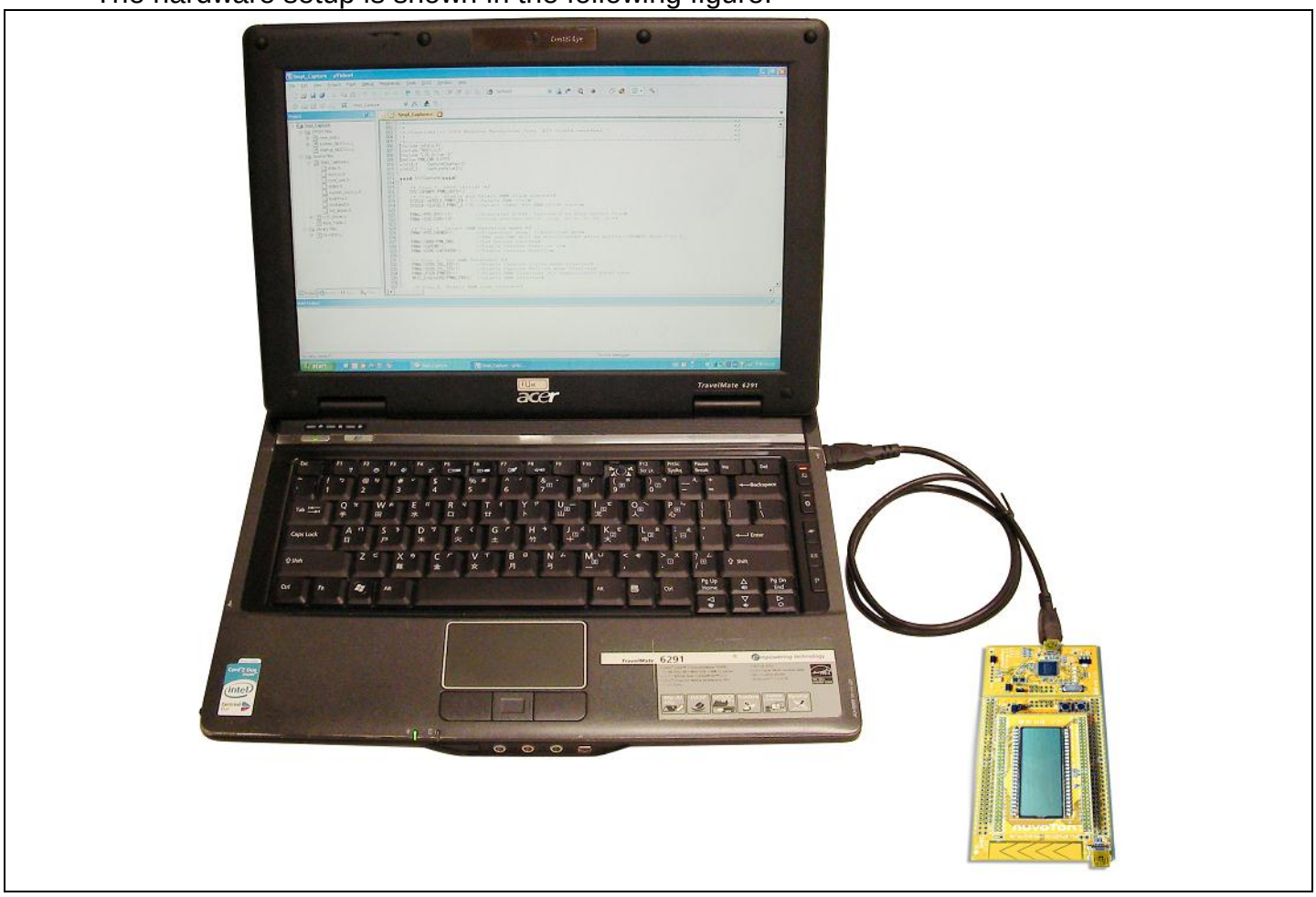


Figure 4-1 NuTiny- SDK-Nano130 Hardware Setup

4.4 LCD_DEMO Example Program

The example, as shown in the directory of *Figure 4-2*, demonstrates the download and debugging of an application on a NuTiny-SDK-Nano130 board. The example file can be downloaded from Nuvoton NuMicro™ website as described in *6.3 Downloading NuMicro™ Nano100 series BSP Software Library*.

Directory	Project File

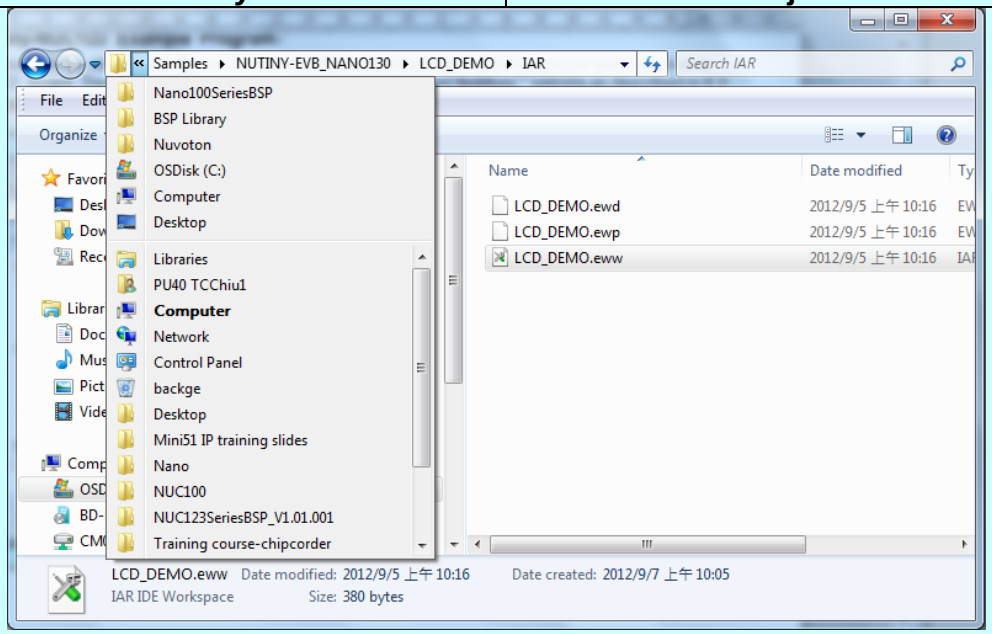
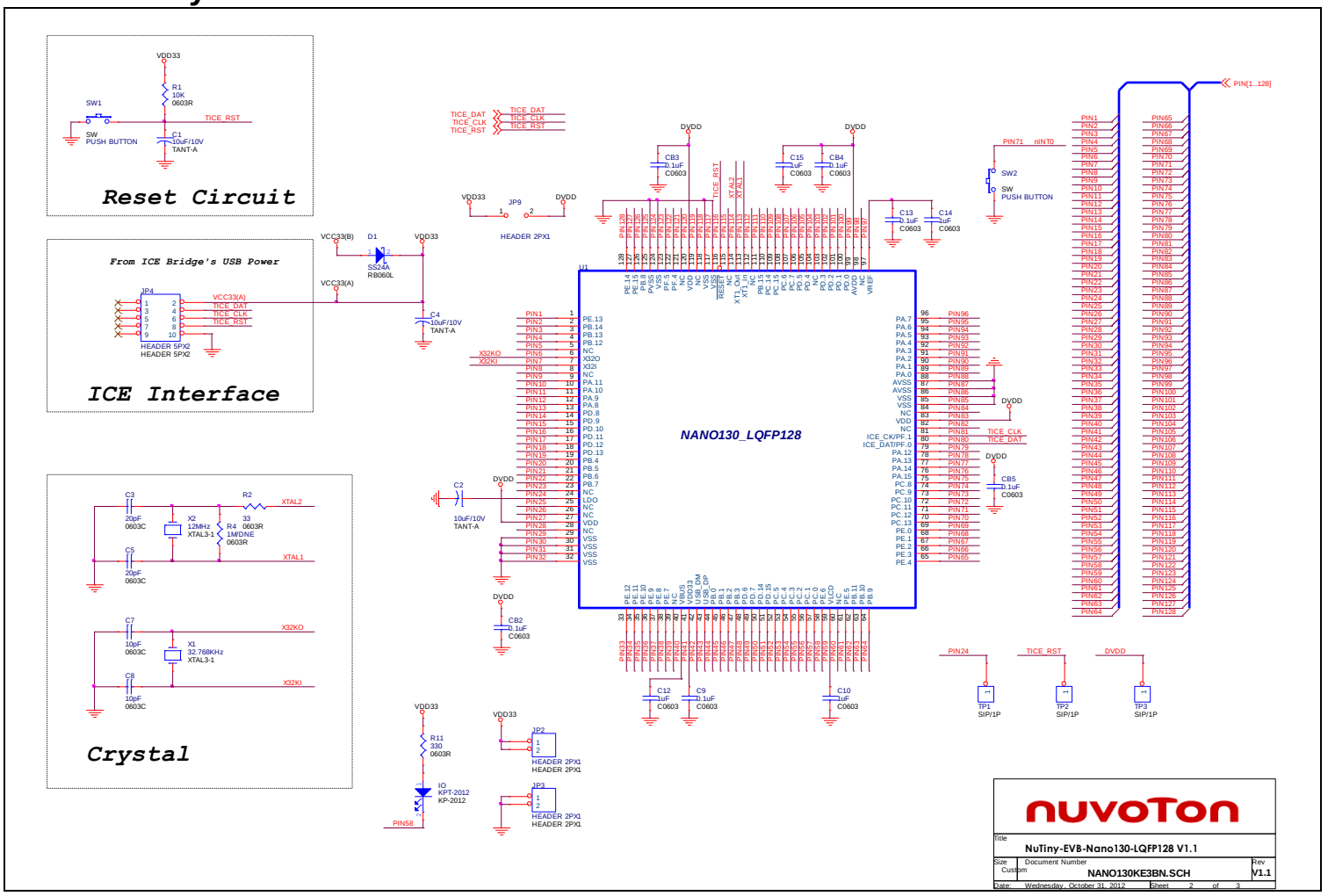


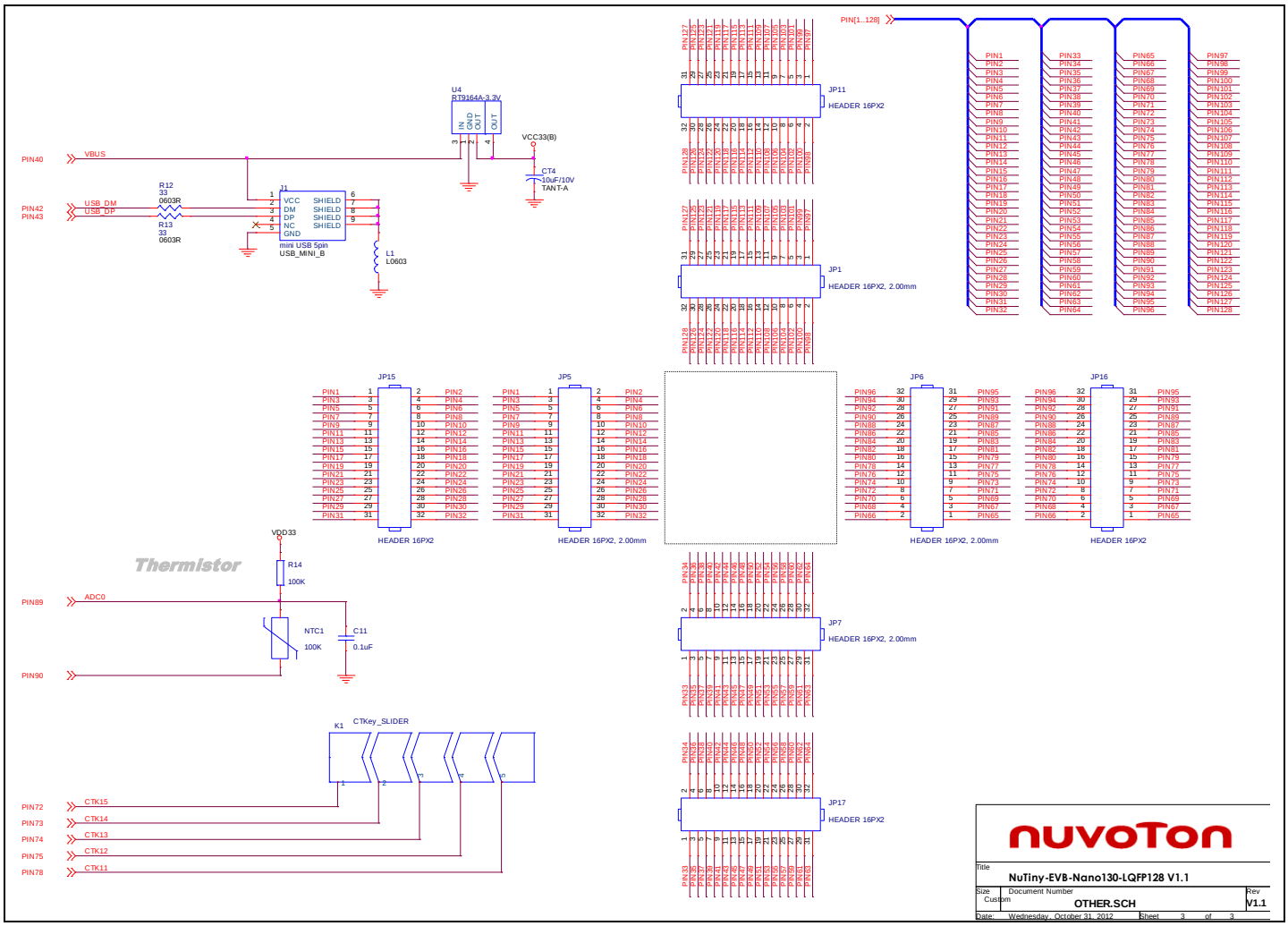
Figure 4-2 LCD_DEMO Example Directory

To use this example:
The LCD panel on the NuTiny-EVB-Nano130 board will display a NUVOTON logo.

- **Start IAR Embedded Workbench**
- **File-Open-Workspace**
  Open the LCD_DEMO.eww workspace file
- **Project - Make**
  Compile and link the LCD_DEMO application
- **Project – Download and Debug**
  Program the application code into on-chip Flash ROM
  - Single step through code
  - Reset the device
  - Run the application

5 NuTiny-EVB-Nano130 Schematics




U4
RT9164A-3.3V
IN
GND
OUT
OUT
VCC33(B)
CT4
10uF/10V
TANT-A
PIN40
VBUS
PIN42
USB_DM
PIN43
USB_DP
R12
33
0603R
R13
33
0603R
J1
VCC
DM
DP
NC
GND
SHIELD
SHIELD
SHIELD
SHIELD
mini USB 5pin
USB_MINI_B
L1
L0603
PIN[1..128]
JP11
HEADER 16PX2
JP1
HEADER 16PX2, 2.00mm
JP15
HEADER 16PX2
JP5
HEADER 16PX2, 2.00mm
JP6
HEADER 16PX2, 2.00mm
JP16
HEADER 16PX2
JP7
HEADER 16PX2, 2.00mm
JP17
HEADER 16PX2
VDD33
Thermistor
R14
100K
PIN89
ADC0
NTC1
100K
C11
0.1uF
PIN90
K1
CTKey_SLIDER
PIN72
CTK15
PIN73
CTK14
PIN74
CTK13
PIN75
CTK12
PIN78
CTK11
Title
NuTiny-EVB-Nano130-LQFP128 V1.1
Size
Custom
Document Number
OTHER.SCH
Rev
V1.1
Date: Wednesday, October 31, 2012
Sheet 3 of 3

6 Downloading NuMicro™ Related Files from Nuvoton Website

6.1 Downloading NuMicro™ Keil µVision® IDE Driver

Step 1	Visit the Nuvoton NuMicro™ website: http://www.nuvoton.com/NuMicro
Step 2	

Step 3

M051 Series BSP_RegCtrlPrg_v1.00.001.zip NUC100 Series Driver Reference Guide	M051 series software package based on register programming coding rule for sample code & user guide.	V1.00.001 V1.03.001
NUC100 Series BSP_CMSIS_v1.03.002.zip NUC100 Series Driver Reference Guide (Simplified Chinese)	NUC100 series software package based on CMSIS version 1.3. It supports both IAR and Keil development environment with drivers and samples codes. Examples source code for NuTiny-100/120 and Learining Board are included. For detailed, please download it and unzip it.	V1.03.002 V1.03.001

Programmer Software Tools Package

File name	Description	Version
ICP Programming Tool (Build 4228) V1.03.zip	NuMicro ICP tool & user manual	V1.03
ISP Programming Tool.zip	NuMicro ISP Programming Tool & user manual	V1.40
NuGang Programmer V5.31.zip	NuGang Programmer software & user manual	V5.31

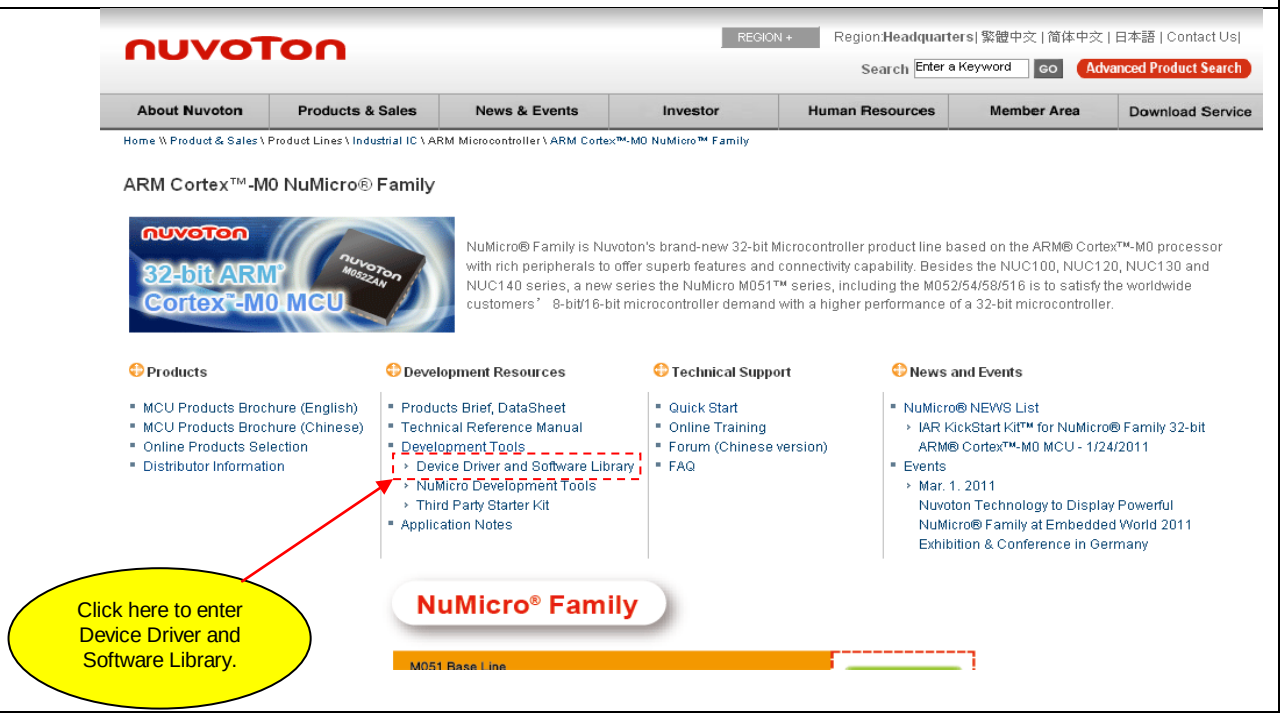
Nu-Link Driver

File name	Description	Version
Nu-Link Driver for Keil RVMDK(Build 4228) V1.03.zip	This driver is to support Nu-Link recognized by Keil RVMDK Development Environment and support all NuMicro Family Devices selectable.	V1.03
Nu-Link Driver for IAR EWARM(Build 4228) V1.03.zip	This driver is to support Nu-Link recognized by IAR EWARM Development Environment and support all NuMicro Family Devices selectable.	V1.03

Contact us: NuMicro@nuvoton.com

Step 4 Download the NuMicro Keil µVision® IDE driver.

6.2 Downloading NuMicro™ IAR EWARM Driver

Step 1	Visit the Nuvoton NuMicro™ website: http://www.nuvoton.com/NuMicro
Step 2	

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ARM Cortex™-M0 NuMicro® Family
32-bit ARM Cortex™-M0 MCU
NuMicro® Family is Nuvoton's brand-new 32-bit Microcontroller product line based on the ARM® Cortex™-M0 processor with rich peripherals to offer superb features and connectivity capability. Besides the NUC100, NUC120, NUC130 and NUC140 series, a new series the NuMicro M051™ series, including the M052/54/58/516 is to satisfy the worldwide customers' 8-bit/16-bit microcontroller demand with a higher performance of a 32-bit microcontroller.
Products
MCU Products Brochure (English)
MCU Products Brochure (Chinese)
Online Products Selection
Distributor Information
Development Resources
Products Brief, DataSheet
Technical Reference Manual
Development Tools
Device Driver and Software Library
NuMicro Development Tools
Third Party Starter Kit
Application Notes
Technical Support
Quick Start
Online Training
Forum (Chinese version)
FAQ
News and Events
NuMicro® NEWS List
IAR KickStart Kit™ for NuMicro® Family 32-bit ARM® Cortex™-M0 MCU - 1/24/2011
Events
Mar. 1. 2011
Nuvoton Technology to Display Powerful NuMicro® Family at Embedded World 2011 Exhibition & Conference in Germany
Click here to enter Device Driver and Software Library.
NuMicro® Family
M051 Base Line

Step 3

M051 Series BSP_RegCtrlPrg_v1.00.001.zip NUC100 Series Driver Reference Guide	M051 series software package based on register programming coding rule for sample code & user guide.	V1.00.001 V1.03.001
NUC100 Series BSP_CMSIS_v1.03.002.zip NUC100 Series Driver Reference Guide (Simplified Chinese)	NUC100 series software package based on CMSIS version 1.3. It supports both IAR and Keil development environment with drivers and samples codes. Examples source code for NuTiny-100/120 and Learining Board are included. For detailed, please download it and unzip it.	V1.03.002 V1.03.001

Programmer Software Tools Package

File name	Description	Version
ICP Programming Tool (Build 4228) V1.03.zip	NuMicro ICP tool & user manual	V1.03
ISP Programming Tool.zip	NuMicro ISP Programming Tool & user manual	V1.40
NuGang Programmer V5.31.zip	NuGang Programmer software & user manual	V5.31

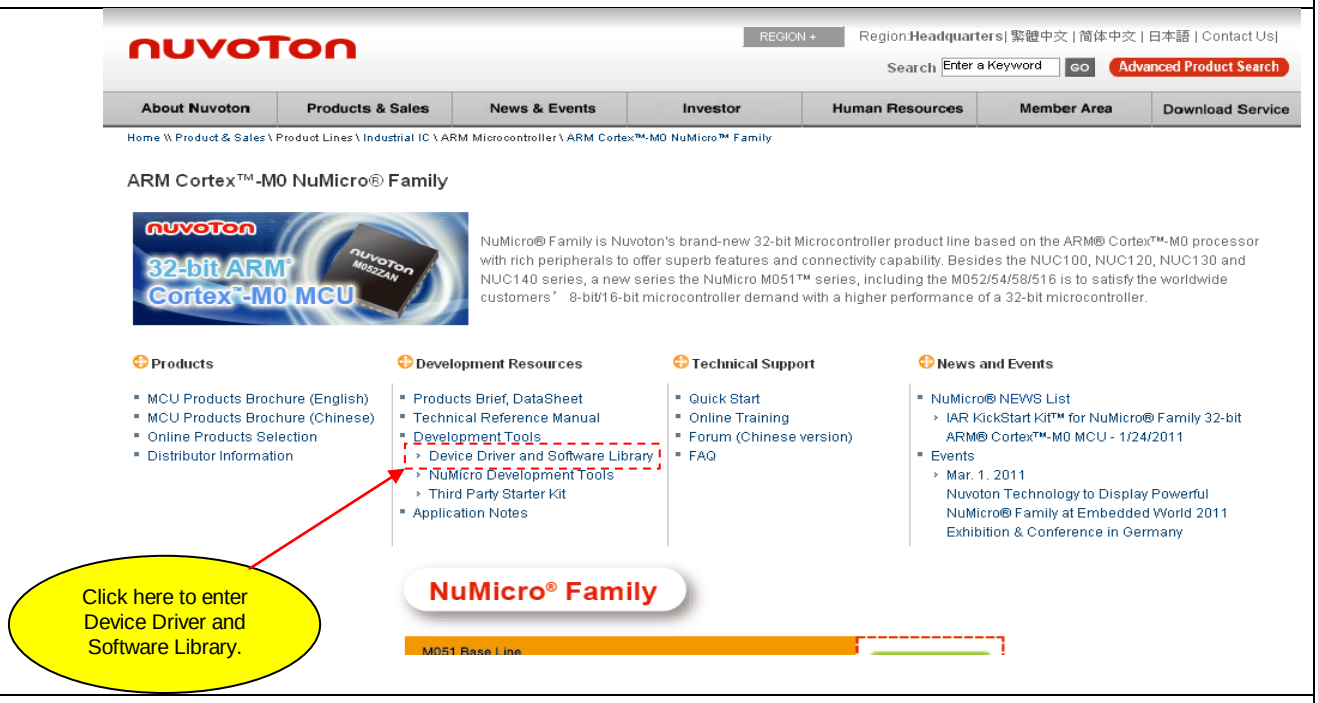
Nu-Link Driver

File name	Description	Version
Nu-Link Driver for Keil RVMDK(Build 4228) V1.03.zip	This driver is to support Nu-Link recognized by Keil RVMDK Development Environment and support all NuMicro Family Devices selectable.	V1.03
Nu-Link Driver for IAR EWARM(Build 4228) V1.03.zip	This driver is to support Nu-Link recognized by IAR EWARM Development Environment and support all NuMicro Family Devices selectable.	V1.03

Contact us: NuMicro@nuvoton.com

Step 4 Download the NuMicro™ IAR Embedded Workbench® driver.

6.3 Downloading NuMicro™ Nano100 series BSP Software Library

Step 1	Visit the Nuvoton NuMicro™ website: http://www.nuvoton.com/NuMicro
Step 2	
Step 3	Download the NuMicro™ Nano100 series software library.

7 Revision History

Revision	Date	Description
1.0	Oct. 16, 2012	Preliminary version

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